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Marine Casualty Investigations

Enquêtes sur les accidents maritimes

Investigation Report to the Minister pursuant to sections 542 or 545 of the Canada Shipping Act

Rapport d'investigation au Ministre conformément aux articles 542 ou 545 de la Loi sur la marine marchande du Canada

Canada

Ce rapport est aussi disponible en français.

REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES ATTENDING THE FIRE AND SUBSEQUENT SINKING OF THE CANADIAN TUG "SEA COMET" NORTH OF GAMBIER IS., HOWE SOUND, B.C. NOVEMBER 12, 1987.

REPORT No. 505

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REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES ATTENDING THE FIRE AND SUBSEQUENT SINKING OF THE CANADIAN TUG "SEA COMET", NORTH OF GAMBIER ISLAND, HOWE SOUND, B.C. ON NOVEMBER 12, 1987

Particulars of Vessel

Name	"SEA COMET" ex "P.M.L. 16"
Official Number	177994
Port of Registry	Vancouver, B.C.,
Call Sign	VYDT
Gross Tonnage	51
Net Tonnage	35
Length (Overall)	18.21 m
Breadth (Registered)	4.87 m
Depth	2.83 m
Draught (At time of casualty)	F.: 1.37 m A.: 3.04 m
Type	Tugboat, wood
Built	1944, New Westminster, B.C.
Re-built	1979, Nanaimo, B.C.
Propulsion	Caterpillar, Model D348, V-12, 4 stroke per cycle, turbo-charged marine diesel, 725 B.H.P., driving a single fixed-pitch propeller
Cargo	None
Crew	Four
Owners	Island Merchant Marine Ltd., 5460 Bayshore Drive, Nanaimo, B.C., V9S 5N7

Navigation Equipment

Radar (1)	Furuno, FR-701

Radar (2)	Furuno, FR-160
Echo Sounder	Seafarer, Model 700
VHF Radiotelephone (1)	Spilsbury & Tindall, FMX-75
VHF Radiotelephone (2)	Hy Gain, HY-SEAS 55
CB Radiotelephone (1)	Universe 23
Magnetic Compass	Saura, 16.5 cm dia.
Auto-pilot	Wagner, Model S.E.

Life-saving Appliances

Liferaft (1)	Dunlop Seafarer,4 person, inflatable, Model 'A' pack
Lifeboat (1)	Davidson, 3.65 m, fibreglass
Lifebuoys (4)	
Immersion Suits (4)	
Search Initiator Buoy (1) (EPlB)	Lucas

Description of Vessel

The "SEA COMET" was a single screw tug used for commercial towing, built in 1944 at the Star Shipyard in New Westminster, B.C. and rebuilt in 1979 by Fairway Towing and Salvage Ltd., of Nanaimo. She was carvel-built, constructed of fir planking on bent oak frames and had a straight stem, eliptical stern and was of round bilge form.

The vessel's deck-house, built of fir and fir plywood exterior and plastic laminate over wood frames on the interior, began forward of amidships and extended aft approximately half of the length of the vessel. The wheel-house was located in the fore part of the house, the skipper's quarters on the port side abaft the wheel-house and an alleyway on the starboard side led to the galley/pantry area. There was a large trunk cabin space abaft the galley enclosing fuel tanks and deck stores. The deck-house had three entrances: the port and starboard wheel-house doors, and a doorway at the starboard side leading into the galley.

Below decks, the "SEA COMET" was divided, by two water-

tight transverse bulkheads constructed of double diagonally-planked fir, into the following compartments: forecastle area/crew accommodation; engine-room/trunk cabin; lazaret. The after engine-room bulkhead, between the engine-room and the trunk cabin, was not watertight and had a permanent opening amidships where the engine reduction gear protruded into the trunk cabin space.

The engine-room was located amidships below the deck-house and was accessed from the main deck via a hatchway at the starboard side of the wheel-house leading to the fore-castle area, thence through a steel watertight door. The forecastle area was also serviced by an escape hatch leading to the forecastle head. The engine-room could also be accessed by a hatchway leading from the galley and via another hatchway leading to the trunk cabin.

The vessel could be operated from either the wheel-house, the flying bridge above the wheel-house, or from a conning station located on the main deck at the starboard side of the trunk cabin. Each station was equipped with a wheel, towing winch abort system and single lever engine controls. Main engine instrumentation in the wheel-house included a water temperature gauge, lube oil, gear oil and fuel oil pressure gauges.

The "SEA COMET" was certificated by the Ship Safety Branch of the Canadian Coast Guard as a Home Trade, Class III, vessel. She was operating on an SIC 17 Certificate issued at Vancouver, B.C., July 11, 1986 and valid until February 18, 1989. Her last periodic survey was carried out at Maple Bay, B.C., July 11, 1986 and the vessel's inspection certificate was short-termed pending her tailshaft inspection.

The "SEA COMET" was surveyed for insurance purposes on April 11, 1985 and again on April 1, 1986 and was remarked to have appeared to be in good condition throughout with evidence of good housekeeping and maintenance practices displayed.

NOTE: All times in this report are expressed in Pacific Standard Time (UTC minus 8 hours)

Background

On the early morning of November 12, 1987, the coastal tug "SEA COMET", with a crew of four on board, delivered a barge to Squamish, in Howe Sound and departed again light ship, to pick up a log tow at the booming grounds south of Port Mellon some 18 miles distant.

While transitting the north part of Thornbrough Channel, a fire broke out in the engine-room, forcing the crew to abandon ship in the ship's lifeboat, 1.27 miles west of Ekins Point, Gambier Island. They were rescued shortly afterward by another tug which was in the immediate area.

Attempts by rescue vessels to quell the fire were unsuccessful and the "SEA COMET" sank at 0625, November 12, 1987 in 232 metres of water close to the abandon ship position.

There were no injuries nor was there any appreciable amount of pollution as a result of this casualty. The vessel was valued at approximately $500,000 with a replacement value of approximately $ 1,400,000.

Narrative

At 1300, November 10, 1987 the tug "SEA COMET" departed from her home port of Nanaimo, B.C., with a crew of four on board including the skipper, to participate in commercial towing in the Howe Sound area.

The crew of the "SEA COMET" consisted of the skipper, the mate/engineer and two deck-hands; the deck-hands also shared cooking duties. When at sea the crew kept a six and six watchkeeping system with two persons to a watch commencing at 0000. The mate/engineer kept the 0000-0600 watch, and the skipper the 0600-1200. The vessel had an unmanned engine-room and it was routine practice for the mate/engineer to be relieved, at intervals, from his wheel-house watchkeeping duties by the deck-hand on watch, in order that he could make rounds in the engine-room several times during his watch.

At 0110, November 12, 1987, the "SEA COMET" secured the barge "CHIEF" with six empty chlorine cars, at the Canadian Occidental Products Dock in Squamish and departed again in a light condition bound for Kingcome Navigation (KN) No.5 booming ground south of Port Mellon some 18 miles distant.

Once clear of Squamish, the skipper, who had been in charge of the vessel's arrival and departure, remained in the wheel-house until the mate/engineer made his rounds in the engine-room; the rounds included checking oil and water levels, temperature gauges and adjusting the auto-pilot. The mate/engineer then assumed the conduct of the vessel at 0130 and the skipper retired to his quarters after passing on his orders verbally.

When the mate/engineer assumed the wheel-house watch the vessel was on automatic pilot proceeding southbound. Although capable of a service speed of 9.6 knots at 1700 rpm, she was proceeding at a reduced speed of 4.5 knots at 1150 rpm in order to arrive at KN No.5 after the morning weather forecast update by Environment Canada to determine if conditions were suitable for towing logs to Nanaimo. Navigation was by radar distances off known points of land and by local knowledge, and since the weather was fair with good visibility at this time, the deck-hand was assigned duties on deck and cleaning duties in the galley.

The "SEA COMET" was participating in the Vancouver Vessel Traffic Services (VTS) reporting system and reported to VTS at 0136 on VHF channel 12, the assigned frequency for that area, informing them of her movements and intentions.

At about 0230 in a position approximately two miles north-east of Defence Islands, the vessel's speed was increased to about 8 knots at 1550 rpm; at this time all engine gauges in the wheel-house showed normal readings.

At approximately 0300, the deck-hand on watch ceased his galley duties to have a cup of coffee, at which time he became aware of a strong smell of burning. He immediately made his way to the wheel-house and reported to the mate/engineer who passed the conduct of the vessel to the deck-hand while he proceeded to investigate. He partially opened the engine-room hatch in the galley area and on being confronted with smoke, immediately re-secured the hatch and awakened the skipper. He then returned to the wheel-house and reduced the vessel's engine speed to an idle.

The skipper arrived in the wheel-house moments later and stopped the vessel in the water heading in a S x W direction, in an approximate position with Ekins Point, Gambier island, bearing 095°T x 1.27 miles: the engine was left running but out of gear.

The weather conditions at the time were reported to be:

Wind	Calm
Sea	Calm
Visibility	Mainly good except 3 miles in hazy patches
Air Temp.	11°C

The second deck-hand was awakened and both deck-hands were instructed to prepare the lifeboat and liferaft for launching. The mate/engineer climbed down the access hatch to the trunk cabin and saw that the fire was at the after end of

the engine-room. He pulled directly on the engine-room fixed CO_2 system release wire close to the CO_2 bottle stowed at the starboard side of the trunk cabin and then climbed out on deck shutting the hatch behind him. He returned to the wheel-house and informed the skipper of events and at 0315 the skipper broadcast a 'Mayday' message on VHF channel 16.

As the CO_2 system did not release, the mate/engineer entered the engine-room via the galley hatchway, securing the hatch behind him. He stood momentarily at the starboard side of the engine and through the smoke he could see flames coming from the after port side of the engine. As the fire was spreading rapidly he had no opportunity to start the pumps nor to fight the fire with extinguishers. He was forced to exit via the forecastle door which he secured behind him. The mate/engineer returned to the wheel-house. The skipper, on receiving an update of the situation, gave the order to abandon the vessel.

The deck-hands had manoeuvred the liferaft and lifeboat from the house top onto the main deck and with the help of the mate/engineer, the lifeboat was launched over the port side with three immersion suits stowed in it; one deck-hand had already donned his immersion suit. The liferaft was not inflated but was secured astern of the lifeboat in the event it might have been needed.

As the crew abandoned the vessel at approximately 0320, November 12, the galley was ablaze and flames were seen coming from the engine-room ventilators on the main deck and on the flying bridge. As they rowed clear of the vessel there was an explosion, followed by a noise as though the fixed CO_2 system had released however, this had little effect other than to dull the flames momentarily.

Vancouver Coast Guard Radio Station (CGRS) intercepted the 'Mayday' at 0315 and notified Rescue Co-ordination Centre (RCC), Victoria. RCC tasked the Canadian Coast Guard (CCG) hovercraft "086" at 0320 from her base at Fraser River and the Canadian Coast Guard Cutter (CCGC) "OSPREY" from Kitsilano Coast Guard Base at 0326.

The tug "SEASPAN CORSAIR" located on the west side of Anvil Island, Howe Sound, with three barges in tow, intercepted the 'Mayday' broadcast and responded immediately that she was proceeding to the scene.

The skipper of the "SEA COMET", who had collected the ship's documents and a battery-powered hand held VHF radio-telephone, was able to communicate with Vancouver CGRS and with the "SEASPAN CORSAIR" after abandoning ship.

The "SEASPAN CORSAIR" arrived on scene at 0400, let go her barges and rescued the four survivors from the lifeboat. Her crew, with fire hoses at the ready, immediately trained them on the burning "SEA COMET".

The CCG hovercraft "086" arrived on scene at 0417 and the CCGC "OSPREY" arrived at 0425. The "OSPREY" immediately commenced pumping foam on board the burning "SEA COMET" however, the vessel had almost burned to the waterline by this time.

The "SEASPAN CORSAIR", her services no longer required, transferred the survivors to the CCG hovercraft "086", picked up her barges and departed from the scene at 0500.

At 0520 the CCGC "OSPREY" had expended her supply of foam and at 0545 she ceased training her hoses on the burning "SEA COMET" as the vessel appeared about to sink.

At 0625, November 12, the "SEA COMET" sank in position 49°32'21"N, 123°24'34"W, in 232 metres of water. The CCGC "OSPREY" cleaned the area of debris before being stood down and departing from the scene at 0635. The EPIB (Search initiator buoy) did not deploy since it was probably consumed in the fire.

The four survivors were landed safely at Kitsilano Coast Guard Base at 0537.

There were no injuries nor was there any appreciable pollution as a result of this casualty.

Analysis

1. Navigation Appliances & Machinery

The navigation appliances and steering gear on the "SEA COMET" were in good working order during the vessel's passage to Squamish and from Squamish to the scene of the casualty and there was no malfunction in the vessel's machinery prior to the casualty.

The mate/engineer completed engine-room rounds after the vessel departed from Squamish at which time no irregularities were found.

2. Fuel Tanks

The "SEA COMET" had a total of six diesel fuel oil tanks all of welded steel construction; two in the engine-room

and the remaining four in the trunk cabin space: total fuel capacity was approximately 18,000 litres. There was approximately 11,360 litres remaining at the time of the casualty of which about 2,500 litres were in the forward engine-room tanks.

Each fuel tank on board the vessel had an independent shut-off valve with an extended spindle to main deck level.

3. Main Engine

Prime motive power was provided by a caterpillar, Model D348, V-12, four-stroke per cycle, turbo-charged marine diesel engine, producing 725 B.H.P. at 1800 rpm. The engine was fresh water cooled through keel coolers and the exhaust was dry through the stack; starting was by compressed air. The engine was fitted with an instrument panel with a tachometer, a lube oil pressure guage, water temperature gauge and boost air pressure gauge.

The engine was built in 1971 and overhauled in July 1985 by the maker's representatives. During the month of July 1987, the engine had a new cylinder head fitted, and on September 30, 1987, the valves were reset and the engine inspected and serviced again by the maker's respresentatives. The engine was inspected by the Ship Safety Branch of the Canadian Coast Guard during the vessel's periodic survey in July 1986.

4. Auxiliary Engine

The auxiliary engine, located at the forward port side of the engine-room, was a two cylinder Isuzu, four strokes per cycle, diesel engine, producing approximately 30 B.H.P. at 1800 rpm. The engine was fresh water cooled through a heat exchanger, had a dry exhaust and a 12 volt starting system. The engine drove a 110 volt, D.C. generator, air compressor, and a 50 mm fire/bilge pump.

The auxiliary engine was not utilized at the time of the casualty.

5. Electrical System

The ship's electrical service was 110 volt, D.C. provided by an 80 amp alternator, belt-driven off the main engine through a main switchboard and distribution panel with circuit breakers located at the forward starboard side of the engine-room.

An identical 80 amp auxiliary generator, belt driven off the auxiliary engine, supplied 110 volt D.C. emergency power through a bank of fourteen 8 volt lead acid batteries connected in series and located at the port side of the trunk cabin space, secured on a shelf above the fuel tanks.

Two 12 volt lead acid batteries located at the forward port side of the engine-room, secured on a shelf above the auxiliary engine and air compressor, were connected in parallel and provided electrical service to the ship's electronic navigation equipment and auxiliary engine starting system: both batteries were isolated through a spark-proof master switch and charged through a 12 volt, 35 amp alternator belt driven off the auxiliary engine.

Sufficient protection against overload was provided in all circuits.

It was reported that all batteries had been renewed approximately one month prior to the casualty.

6. Fire-fighting

Boat and Fire Drills

The "SEA COMET", being over 15 tons gross, was subject to quadrennial inspection by the Ship Safety Branch of the Canadian Coast Guard and, as a vessel that is required to carry an Inspection Certificate, she is required under section 5(1)(c)(i) of the 'Boat and Fire Drill Regulations' made pursuant to the Canada Shipping Act, to practice boat and fire drills at intervals of not more than one month.

It was reported by the crew that the required drills were carried out.

Equipment

The vessel was equipped with two fire pumps located in the engine-room:

Fire/Bilge Pump - 3.8 litre per second, 50 mm diameter centrifugal pump, driven by hydraulic power take-off on the main engine with 344 kPa (50 p.s.i.) maximum discharge pressure at

pump; serviced all bilges through a common manifold with direct sea suction for services to the fire lines.

Fire/Bilge Pump - 3.8 litre per second, 50 mm diameter centrifugal pump, belt driven by the auxiliary engine, provided back up service through the same bilge manifold and fire line.

The vessel was also equipped with a 38 mm, single cylinder, gasoline powered, portable scow pump for emergency use. She had a 38 mm diameter fire main with one hydrant located at the port side of the deck-house with 10 metres of 38 mm diameter hose and combination nozzle.

Fire Extinguishers

The "SEA COMET" was equipped with the following fire extinguishers:

Wheel-house	- 1 x 2.2 kg	Dry Chemical (D.C.)
Galley	- 1 x 6.75 kg	CO_2
Forecastle	- 1 x 4.5 kg	D.C.
Trunk Cabin	- 1 x 4.5 kg	CO_2
Engine-room (Fwd Bulkhead)	- 1 x 6.75 kg	CO_2
Engine-room	- 1 x 2.25	D.C.
Spare (Mate/Engr's cabin)	- 1 x 6.75	CO_2

Miscellaneous

Fire-fighting equipment included three fire buckets mounted on an approved rack located on the flying bridge and three fire axes at convenient points around the vessel. The vessel is not required by Regulation to carry a fireman's outfit (breathing apparatus) and did not do so.

Engine-room Fixed CO_2 System

The engine-room was equipped with a CO_2 fixed smothering medium of 22.7 kg capacity, hydrostatic-tested and recharged in Nanaimo, May 1987.

The CO_2 bottle was located at the starboard side of the trunk cabin space with the release located at the starboard side of the main deck outside the house. The

system was also fitted with a heat sensor-activated release, and an alarm in the engine-room and a buzzer and indicator light in the wheel-house. The system had a 20 second delay to allow personnel time to clear the engine-room spaces.

The mate/engineer attempted to release the fixed CO_2 system by pulling on the wire beside the bottle in the trunk cabin space however, the system did not activate at the time and no further attempts were made to release it from the main deck area release. The system is thought to have been released automatically by the heat sensor device as after the crew abandoned ship and rowed a short distance from the vessel, an appropriate hissing noise was heard followed by a cessation of the flames for a short period of time and a glow could be seen coming from the wheel-house, thought to be the CO_2 release-indicator light.

7. Engine-room Ventilation

The machinery space was provided with forced draught ventilation from a fan situated in the trunk cabin space abaft the engine reduction gear to which air was fed from two ventilators on the trunk cabin top.

The engine-room was also ventilated by two natural draught fixed-direction cowl ventilators, one located at each side of the main deck-house pointing aft and abaft of those, were two mushroom ventilators which were both closed at the time of the casualty. There was also a large cowl ventilator leading to the engine-room from the after end of the flying bridge: it was trimmed aft at the time of the casualty.

The crew of the "SEA COMET" did not attempt to blank the ventilation off to stem the flow of air to the engine-room nor to shut down the forced draught fan. They reported that there were no dampers or other fixed means of readily blanking off the engine-room ventilators and eventually flames were seen coming from these vents.

This testimony is contradictory to the Canadian Coast Guard Ship Safety Branch periodic survey report which lists vent dampers as being in satisfactory condition. The marine surveyors for the insurance company also maintain that there was a damper at each engine-room vent.

Although the "SEA COMET" did not require to have a fixed smothering system in the engine-room to comply with the

Fire Detection and Extinguishing Equipment Regulations made pursuant to the Canada Shipping Act, it would appear to be only prudent that since the vessel was so fitted that proper means to isolate the engine-room space would have been provided.

8. General

The fire was observed to be coming from the after port side of the main engine and though the precise location and cause could not be identified through the smoke, it is thought to have been caused by a broken oil feed-line or a broken high pressure fuel injection line, either of which would spray diesel oil onto the hot exhaust housing of the turbo-charger or engine exhaust located in that area, both with operating temperatures above the auto-ignition temperature of the fuel oil, causing the oil to ignite.

The oil feed-lines located close to the turbo-charger operate within a pressure range of about 310-448 kPa (45-65 p.s.i.) and the high pressure fuel injection lines, located about mid-length on the engine, operate within a pressure range of about 34,473-68,948 kPa (5,000 -10,000 p.s.i.).

No one on board the vessel shut down the main engine after the fire was discovered although there was an emergency shut-off located in the wheel-house. In not doing so, a constant supply of fuel would have been fed to the fire, provided it was, in fact caused by a broken fuel line or fuel injection line. Fuel lines and fuel injection lines are of thick steel-walled tubing, however, it is feasible that a line could crack due to vibration.

The "SEA COMET" was drydocked in Nanaimo from November 3 to November 6, 1987 for hull and rudder repairs and also to have the propeller faired as the vessel had been experiencing some slight vibration.

Each fuel tank on board the vessel had an independent shut-off valve, none of which was closed after the fire was discovered.

The port side of the engine-room was not used to stow inflammable stores and the engine-room bilges, fitted with automatic pumps, were reportedly clean, dry and free of oily rags.

The engine exhaust stack was lagged above the engine and

had a wall built around it in the galley.

The forward port side of the trunk cabin space immediately abaft the wooden watertight bulkhead, was used to stow kerosene, lube oil and oil lanterns.

9. Search and Rescue

The following units were tasked by RCC Victoria on the morning of November 12, 1987:

0320	Hovercraft CCG "086"
0326	CCGC "OSPREY"

The tug "SEASPAN CORSAIR" intercepted the 'Mayday' and immediately proceeded to the scene, rescuing the survivors from their lifeboat at 0400.

10. Weather

The Marine forecast for Georgia Strait, issued by Environment Canada at 2245, November 11, 1987 and valid until 2300, November 12, 1987, was as follows:

GEORGIA STRAIT

Small Craft Warning

> Winds southeast 10 to 20 increasing to 15 to 25 Thursday afternoon, showers, patchy fog, visibility reduced to three miles in showers and near zero in fog.
> Outlook. Moderate to strong southeast winds.

Rescue craft reported weather conditions at the scene as being light/calm winds, calm seas, and good visibility except 0.25 miles in fog patches.

11. Survival/Distress Equipment

The vessel complied with the appropriate regulations in the amount and type of approved equipment.

Lifejackets	The crew did not have occasion to enter the water and did not wear lifejackets.
Liferaft	The 4 person Dunlop inflatable liferaft was stowed on the flying bridge. It was manoeuvred to the main deck by the crew and was secured astern of the lifeboat: it was not inflated.

EPIB	A LUCAS search initiator buoy was carried on board the vessel however the vessel was gutted by fire before sinking.
Immersion Suits	None required by regulation, however, four were carried; one crewmember donned his immersion suit and the remaining three were stowed in the lifeboat.
Lifeboat	One 3.65 m fibreglass lifeboat was stowed in chocks on the flying bridge. It was manoeuvred onto the main deck and launched over the port side; weather conditions allowed the crew to abandon ship in this small craft.
Lifebuoys	The vessel was equipped with four lifebuoys of which one had a light attached and two had lines.
R/T	The vessel was equipped with two VHF radiotelephones and one portable battery-operated VHF. The 'Mayday' was transmitted on VHF channel 16 and received by Vancouver CGRS; the portable VHF was used from the survival craft.

12. Experience and Qualifications of Personnel

(a) The skipper of the "SEA COMET" held a Master 350 Ton Certificate of Competency issued at Vancouver, B.C., December 12, 1966. He previously possessed a Master Minor Waters Certificate of Competency issued at Vancouver, October 25, 1954. He commenced seagoing in 1939 and has sailed as skipper since 1949, spending the past 5 years as skipper on the "SEA COMET". He underwent fire-fighting training some years ago but has not attended the available Marine Emergency Duties (MED) training course.

(b) The mate/engineer of the "SEA COMET" did not hold a Certificate of Competency from the Department of Transport nor was he obliged to hold a certificate to sail in the capacity of mate/engineer. He had 32 years seagoing experience of which the past 4 years were on board the "SEA COMET". He has not attended a MED training course, however he spent some time

as a volunteer fireman with the Gibsons, B.C. Fire Department.

(c) The deck-hands had 15 years and 1 1/2 years experience of which approximately 4 years and 1 1/2 years respectively, were on board the "SEA COMET".

Findings

On the early morning of November 12, 1987 during the hours of darkness, whilst in the vicinity of Thornbrough Channel, Howe Sound, the tug "SEA COMET" caught fire in the engine-room. The fire spread rapidly throughout the wooden vessel causing the crew to abandon ship and the vessel to founder.

The precise cause of the fire could not be determined, but of the various possibilities, it would appear that the most likely cause was that:

- a cracked fuel oil line or high pressure fuel injection line on the port side of the main engine sprayed diesel oil onto the hot exhaust housing of the turbocharger or engine exhaust, both of which have operating temperatures greater than the auto-ignition temperature of the fuel oil, thereby causing the diesel oil to ignite.

It would appear that the fire was not brought under control for the following reasons:

- the CO_2 smothering system did not activate when the release wire was pulled in the trunk cabin space and no further attempt was made to release it from the main deck release;

- the main engine was not shut down to stop the fuel supply to the fire;

- not shutting down the main engine contributed to the fire spreading so rapidly that there was no time to utilize the vessel's fire-fighting equipment;

- the fuel tank remote shut-off valves were not closed; and

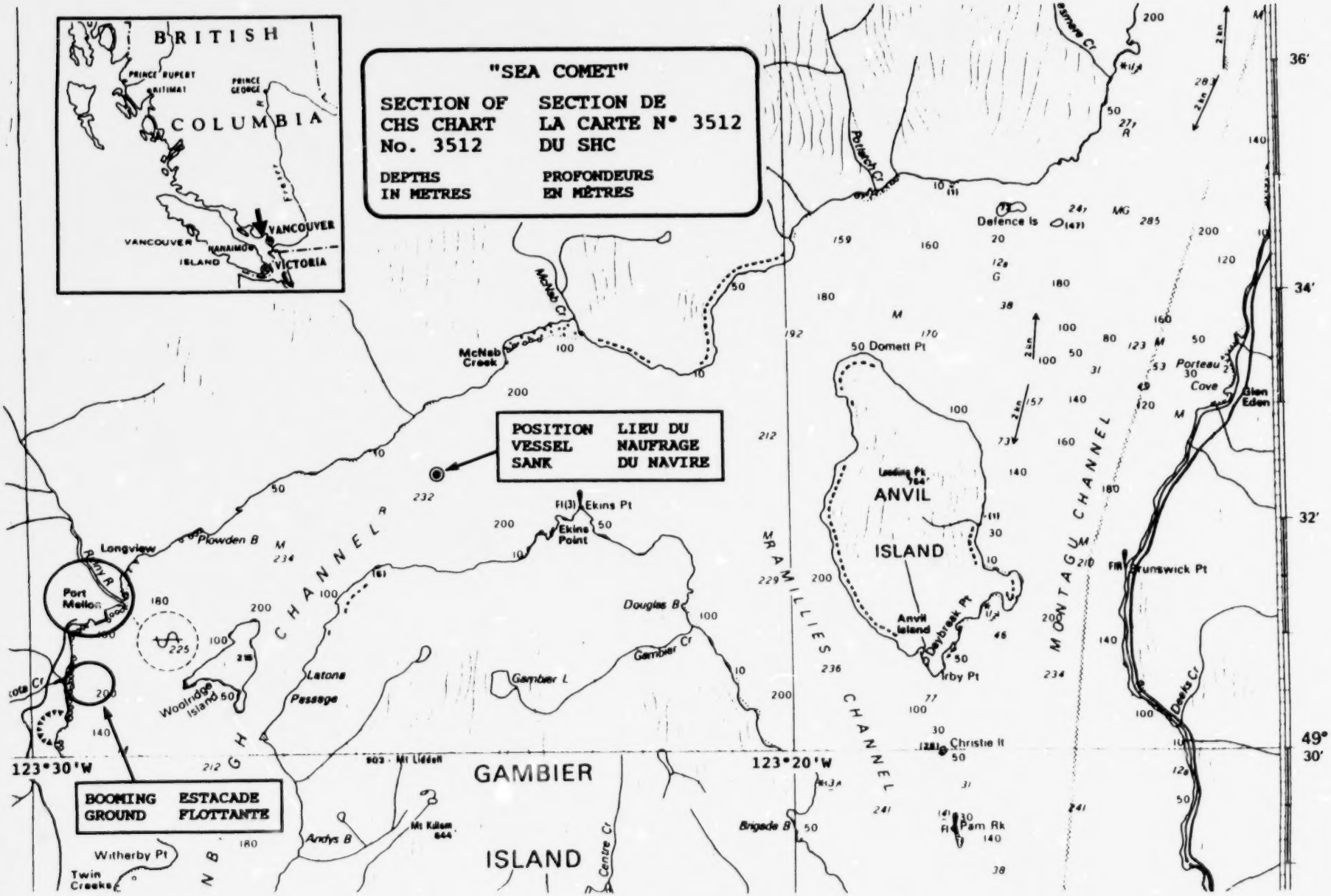
- the engine-room forced draught ventilation fan was not shut down and outside ventilation was not sealed off.

Other Findings

The assistance given by the crew of the "SEASPAN CORSAIR" was prompt and in keeping with good seamanship.

As protective clothing and breathing apparatus were not available and no one was standing by to assist, it was imprudent for the crew member to enter the engine-room after the discovery of the fire.

OTTAWA, ONTARIO
SEPTEMBER 1988.


"SEA COMET"
SECTION OF CHS CHART No. 3512
SECTION DE LA CARTE N° 3512 DU SHC
DEPTHS IN METRES
PROFONDEURS EN MÈTRES
POSITION VESSEL SANK
LIEU DU NAUFRAGE DU NAVIRE
BOOMING GROUND
ESTACADE FLOTTANTE
BRITISH COLUMBIA
PRINCE RUPERT
PRINCE GEORGE
VANCOUVER
VANCOUVER ISLAND
NANAIMO
VICTORIA
McNab Creek
Longview
Plowden B
Port Mellon
Woolridge Island
Latona Passage
Ekins Pt
Ekins Point
Douglas B
Gambier L
Gambier Cr
GAMBIER ISLAND
Mt Liddell
Mt Killam
Witherby Pt
Twin Creeks
Andys B
Centre Cr
Defence Is
Domett Pt
ANVIL ISLAND
Anvil Island
Daybreak Pt
Christie It
Brigade B
Pam Rk
Porteau Cove
Glen Eden
Brunswick Pt
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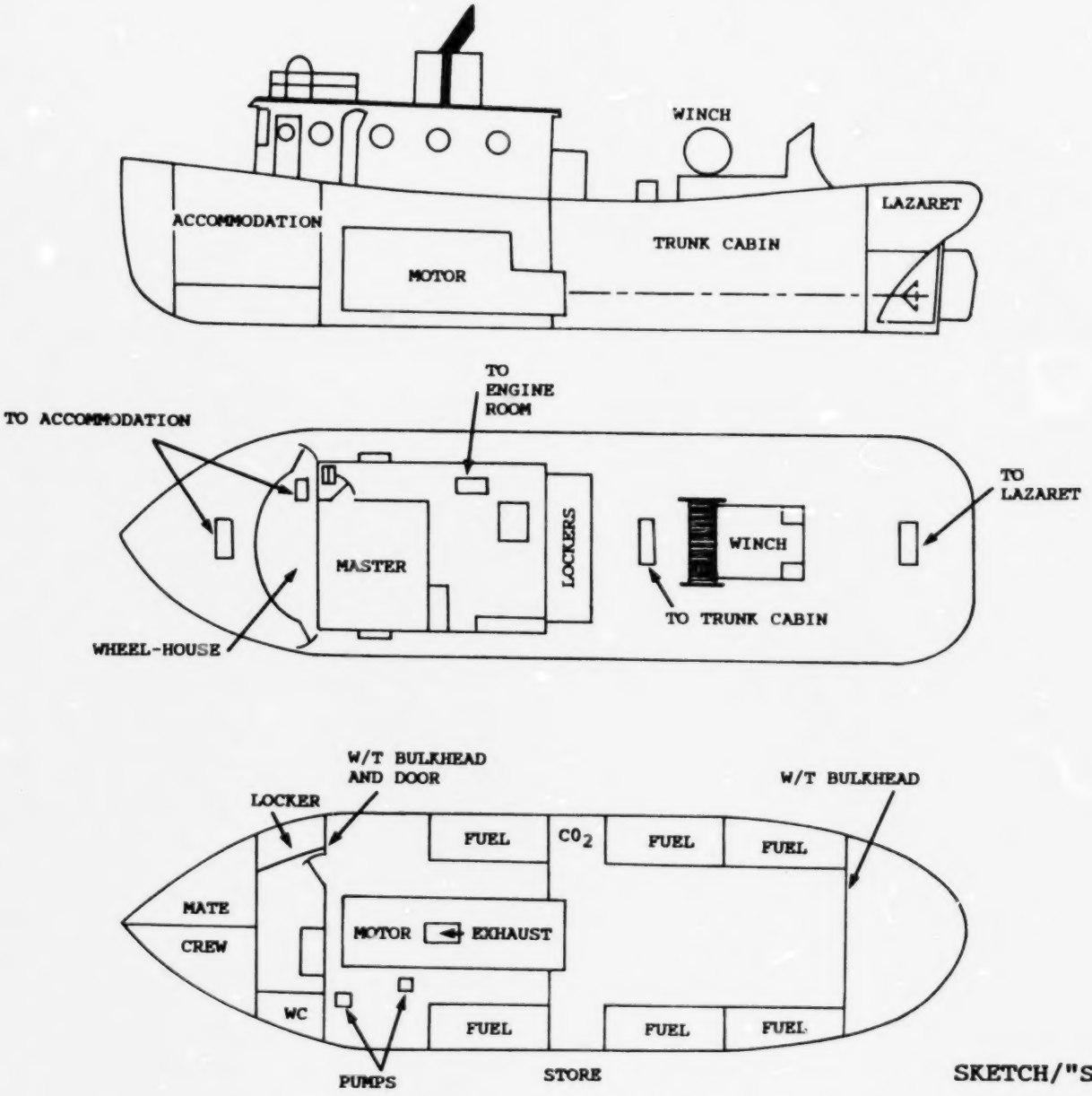

SKETCH/"SEA COMET"

NOT TO SCALE

"SEA COMET"